DESIGN OF AN INTEGRATED TRICYCLE TERMINAL OF AMPARO, CAPITOL, VICTORY TODA AT MAKABUD STREET, AMPARO SUBDIVISION, BARANGAY 179, CALOOCAN CITY

A Research Paper

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Bachelor of Science in Civil Engineering

Major in Construction Engineering

and Management

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RECOMMENDATION

This is to certify that this research, titled "DESIGN OF AN INTEGRATED TRICYCLE TERMINAL OF AMPARO, CAPITOL, VICTORY TODA AT MAKABUD STREET, AMPARO SUBDIVISION, BARANGAY 179, CALOOCAN CITY," prepared and submitted by Meckiel Envern M. Amadore, John Michael R. Maaño, and Julius Carl B. Macasinag in partial fulfillment of the requirements for the degree Bachelor of Science in Civil Engineering Major in Construction Engineering and Management, have been examined and PASSED the Pre-Oral Defense.

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CERTIFICATE OF ORIGINALITY

We hereby certify that this thesis is our own work and that to the best of our knowledge and belief, it contains no material previously written or published by another person or organization nor any material which has been accepted for award of any other degree or diploma from a university or institution of higher learning, except where due acknowledgement is made thereof.

Furthermore, we declare that the intellectual content of this thesis is the product of our work although we have received assistance from others on the manner of organization, presentation, language, and style.

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CHAPTER 1

The Problem and Its Background

This chapter presents the overview of the study. It includes the introduction, background of the study, theoretical framework, conceptual framework, statement of the problem, hypothesis, significance of the study, scope and limitations of the study, and definition of terms.

Introduction

Transportation plays an essential role in supporting economic activities and meeting the mobility needs of society. This has made people's lives easier by allowing most work and jobs to be completed much faster than they were previously. In contrast to the past, when people primarily relied on walking and complex vehicles for long-distance travel, today's transportation options have significantly improved to better meet people's needs (Guerrero, 2020).

Transport terminals serve as organized spaces that help manage the flow of passengers and transportation services. Well-planned terminals not only improve road safety but also contribute to a better commuting experience by providing seating and amenities for passengers and drivers. However, the absence of designated spaces for maintenance, waiting sheds, or waste management facilities can negatively impact the comfort, safety, and environmental sustainability of operations.

In the Philippines, the Department of the Interior and Local Government (DILG, 2020) defines a Tricycle Operators and Drivers Association (TODA) as an organization of tricycle operators and drivers recognized and regulated by local government units to ensure safe and organized tricycle operations. Despite this regulation, DILG mandates LGUs to organize TODAs, lacking access to government assistance and support for financial management, resulting in an oversupply of tricycles and traffic congestion.

Tricycles remain one of the most accessible and affordable modes of transport in many urban and suburban areas for those who lack access to larger public vehicles. It also provides additional income and employment for those who do not have a formal job (Udousoro & Udoh, 2024). However, the lack of an integrated terminal often leads to road obstruction, congestion, no proper waiting areas for passengers who wait along the roadsides and poor sanitation in public areas.

Background of the Study

In the Philippines, tricycles are one of the means of public transportation, particularly in barangays and subdivisions where larger vehicles cannot easily navigate.

In front of the Holy Cross Parish Church lies a line of tricycles that transport students, professors, workers and churchgoers alike from one place to another. The Amparo, Capitol, Victory Tricycle Operators' and Drivers' Association (ACV TODA) is the oldest association of tricycle drivers and operators that runs the

Amparo-Capitol-Victory route. Apparently, being the oldest association is not enough for them to acquire the privilege of having a fully operational terminal.

The problem with the country's poor urban planning causes small transport terminals, especially tricycle terminals, to use locations that are not supposed to be used as terminals. Most TODA terminals use sidewalks as their location, which they line up to, to await passengers. (Guerrero et al., 2020).

This results in people not being able to use said sidewalk and being forced to walk on main roads, where they are subject to the danger of passing vehicles. To lessen such events from happening, this research will design a terminal with a location that would not interfere with the pathways meant for walking. Currently, the ACV TODA is placed on a sidewalk, and the researcher plans on relocating this terminal as well as designing it to be more high-functioning and fully operational.

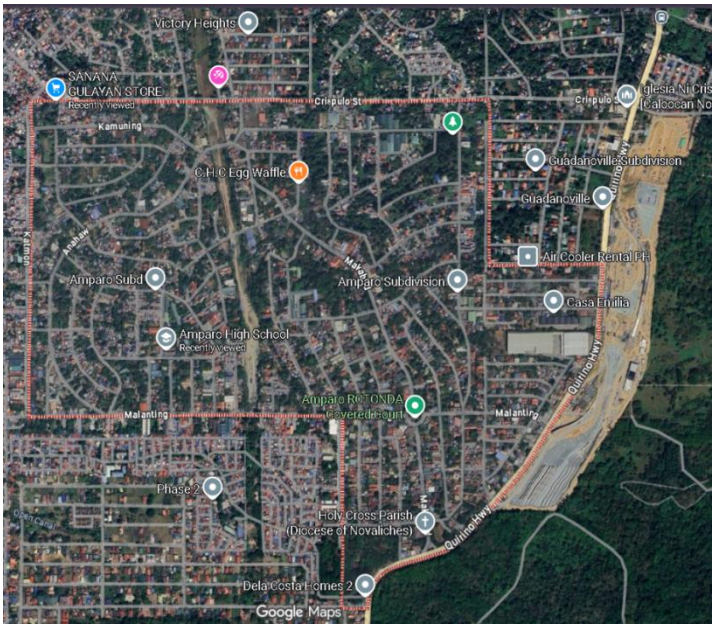


Figure 1. *Map of Barangay 179 Showing the Route of Amparo-Capitol-Victory*

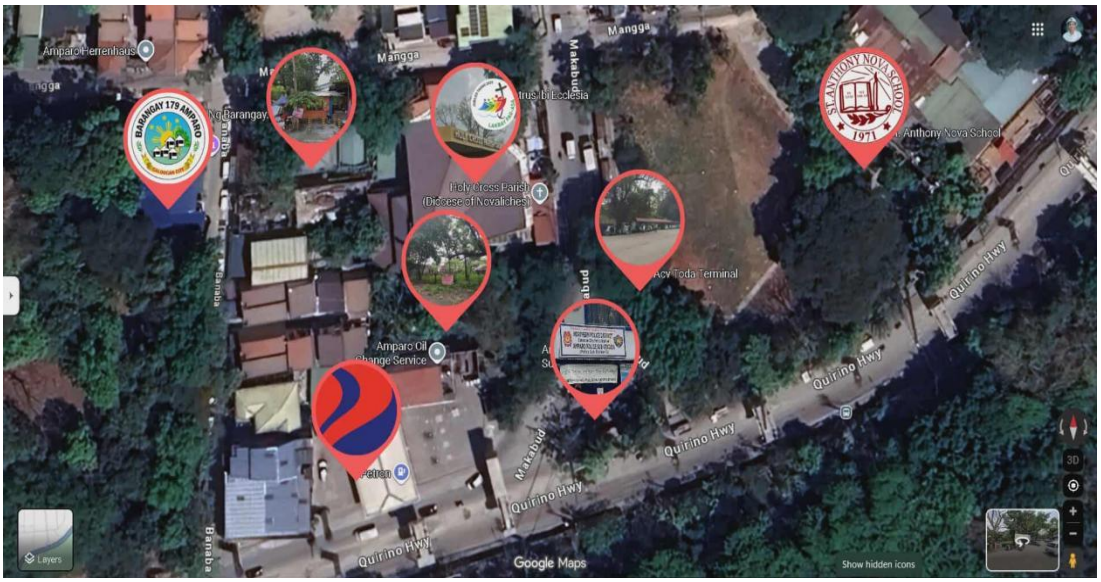


Figure 2. *Vicinity Map*

The ACV TODA Terminal is located along Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City, near Quirino Highway which is a national road. It is surrounded by key landmarks such as Holy Cross Parish, Barangay Hall of Barangay 179 and Botika ng Barangay 179, Amparo Police Substation 15, Petron Gasoline Station, and St. Anthony Nova School. The area is accessible from a major route consisting of residential and commercial establishments, and serves as a key transportation hub for residents of Amparo Subdivision.

Theoretical Framework

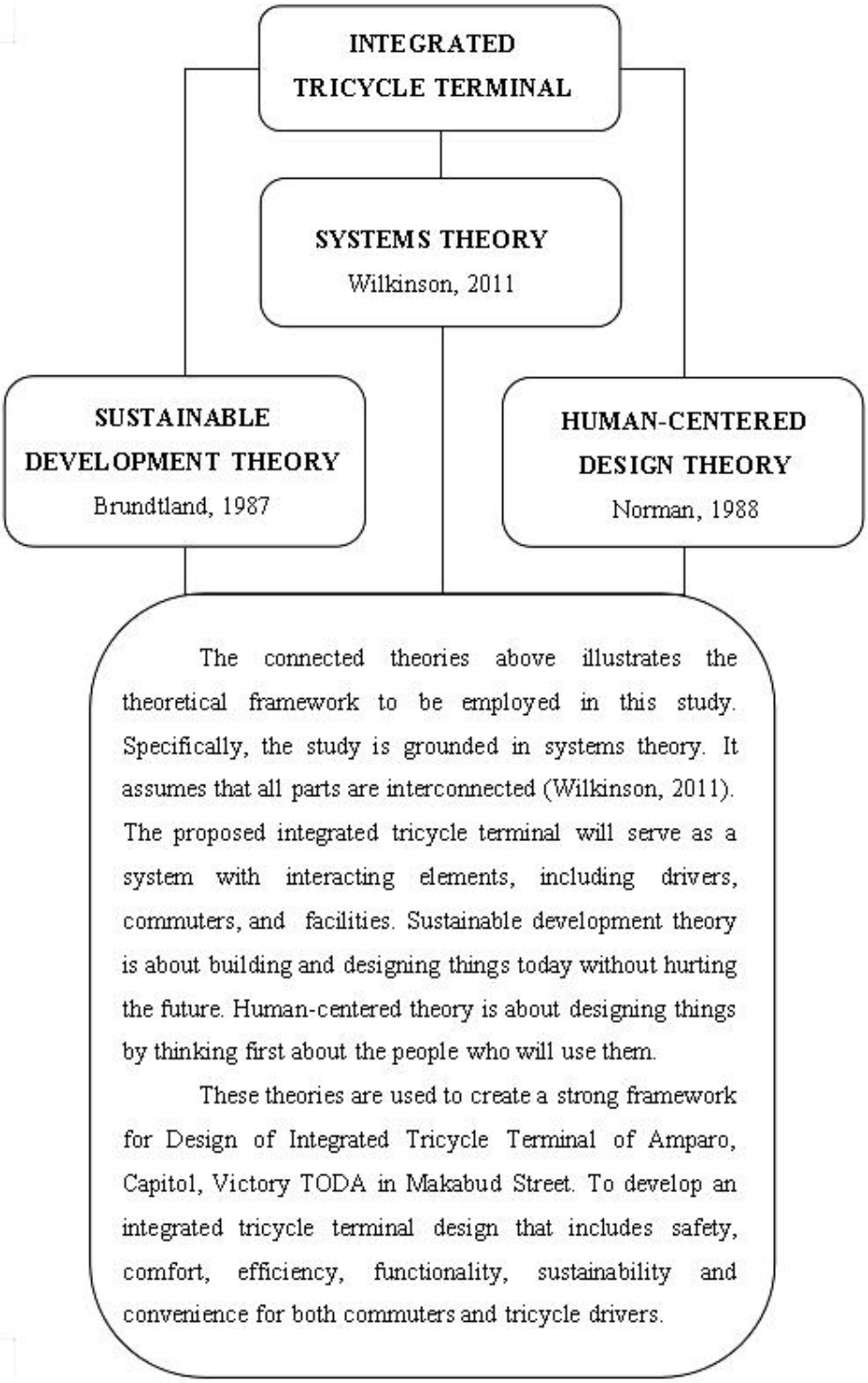

INTEGRATED TRICYCLE TERMINAL
SYSTEMS THEORY
Wilkinson, 2011
SUSTAINABLE DEVELOPMENT THEORY
Brundtland, 1987
HUMAN-CENTERED DESIGN THEORY
Norman, 1988
The connected theories above illustrates the theoretical framework to be employed in this study. Specifically, the study is grounded in systems theory. It assumes that all parts are interconnected (Wilkinson, 2011). The proposed integrated tricycle terminal will serve as a system with interacting elements, including drivers, commuters, and facilities. Sustainable development theory is about building and designing things today without hurting the future. Human-centered theory is about designing things by thinking first about the people who will use them.
These theories are used to create a strong framework for Design of Integrated Tricycle Terminal of Amparo, Capitol, Victory TODA in Makabud Street. To develop an integrated tricycle terminal design that includes safety, comfort, efficiency, functionality, sustainability and convenience for both commuters and tricycle drivers.

Figure 3. *Theoretical Framework*

Conceptual Framework

INPUT	PROCESS	OUTPUT
1. How does the demographic profile of the respondents be gauged in terms of: 1.1 Age 1.2 Gender 1.3 Role 2. How does the existing conditions of the current tricycle station in Makabud Street, Amparo Subdivision be assessed in terms of: 2.1 Accessibility 2.2 Organization 2.3 Facilities 3. How do the problems encountered by tricycle drivers, commuters and the residents be measured	1. Survey questionnaire 2. Interview guide 3. Design proposal and simulation 4. Cost estimation 5. Statistical analysis of data	

that lead to the design terminal, in terms of: 3.1 Operation 3.2 Space Management 3.3 Traffic Flow 4. How can the proposed terminal integrate amenities that will effectively addressed the problems of the current tricycle station in terms of: 4.1 Functionality 4.2 Sustainability 4.3 Convenience 5. How can the proposed terminal design contribute to enhancing commuter experience in Barangay 179, Caloocan City in terms of:		

5.1 Safety 5.2 Comfort 5.3 Efficiency		

Figure 4. *Conceptual Framework*

Statement of the Problem

This research aims to Design an Integrated Tricycle Terminal of Amparo, Capitol, Victory TODA at Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City.

Specifically, this research aims to address the following questions:

1. How does the demographic profile of the respondents be gauged in terms of:

    1.1 Age

    1.2 Gender

    1.3 Role

2. How does the existing conditions of the current tricycle station in Makabud Street, Amparo Subdivision be assessed in terms of:

    2.1 Accessibility

    2.2 Organization

    2.3 Facilities

3. How do the problems encountered by tricycle drivers, commuters and the residents be measured that lead to design of terminal in terms of:

3.1 Operation

3.2 Space Management

3.3 Traffic Flow

4. How can the proposed terminal integrate amenities that will effectively addressed the problems of the current tricycle station in terms of:

4.1 Functionality

4.2 Sustainability

4.3 Convenience

5. How can the proposed terminal design contribute to enhancing commuter experience in Barangay 179, Caloocan City in terms of:

5.1 Safety

5.2 Comfort

5.3 Efficiency

Objectives of the Study

The main goal of this research is to design an integrated tricycle terminal together with amenities and design facilities at Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City. This research will address the existing problems of the current tricycle station and enhance the overall functionality, sustainability and convenience for both drivers and commuters.

Specifically, the objectives of the research are the following:

1. To assess the demographic profile of the respondents in terms of age, gender, and role.

2. To evaluate the existing conditions of the current tricycle station at Makabud Street, Amparo Subdivision in terms of accessibility, organization and facilities.

3. To identify the problems encountered by tricycle drivers, commuters, and the residents that led to the proposal of designing a new integrated terminal in terms:

    3.1 Operation

    3.2 Space Management

    3.3 Traffic Flow

4. To determine the amenities and facilities that can be integrated into the proposed terminal to effectively address the identified problems in terms of:

    4.1 Functionality

    4.2 Sustainability

    4.3 Convenience

5. To propose a terminal design that enhances commuter experience in terms of:

    5.1 Safety

    5.2 Comfort

    5.3 Efficiency

Hypothesis

Null Hypothesis (Ho): The proposed design of the TODA terminal does not significantly improve commuter experience, and fully-operational terminal compared to the existing condition.

Alternative Hypothesis (Ha): The proposed design of the TODA terminal significantly improves commuter experience and fully-operational terminal compared to the existing condition.

Significance of the Study

The proposed design of an Integrated Tricycle Terminal of Amparo, Capitol, Victory TODA at Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City will be beneficial to the following:

Commuters, this study provides a safer, more comfortable, commuter-friendly experience.

Tricycle Drivers and Operators (ACV TODA) , the terminal design aims to create an integrated terminal that will improve their working environment by relocating this terminal as well as designing, providing amenities and facilities.

Residents, this research can strengthen the identity of Barangay 179 as a community-friendly community.

Local Government of Caloocan City, the research supports urban planning by offering community-based solutions to common problems in public transport terminals.

Future Researchers, this research can serve as reference material in exploring transportation terminals and community-based infrastructure projects.

Scope and Limitation of the Study

This research focuses on the planning, and proposed design of a Integrated Tricycle Terminal of Amparo, Capitol, Victory TODA located at Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City within the identified site.

The research also involves identifying problems encountered by tricycle drives, commuters, and nearby residents, which serve as the basis for proposing an improved terminal design. The study uses data collected through survey questionnaires and interviews among tricycle drivers, commuters, and selected community members within the study area.

It covers layout design, safety features, amenities, waste management and accessibility for commuters. In order to plan and render an integrated tricycle terminal, the researchers will create a site development plan, floor plan, and 3D Architectural layout using AutoCad and Sketch Up.

The research does not include the actual construction phase but only provides a design proposal. The implementation depends on coordination with residents, LGU's and ACV TODA.

Definition of Terms

Amenities are a desirable or useful feature or facility of building or place. In this study, it refers to facilities provided in the proposed design of integrated tricycle terminal for the ACV TODA.

Barangay is the smallest local government unit in the Philippines. In this study, it refers to the community of Barangay 179.

Commuters is a person who travels using a tricycle as a mode of transportation within a community. In this study, this refers to the students, professors, workers, senior citizens, PWD, churchgoers and other people within the Amparo Subdivision, Barangay 179, Caloocan City.

Driver is a person who drives a vehicle. In this study, it refers to tricycle drivers.

Integrated is combined, unified or working together as one. In this study, various facilities and amenities are designed together in ACV TODA terminal.

Terminal is a facility of starting and ending points of public transportation. In this study, it is a location that serves as a waiting area where tricycle park, load and unload passengers in Makabud Street, Amparo Subdivision.

Tricycle is a three-wheeled vehicle. In this study, it refers to motorcycles with an engine and passenger sidecar.

TODA (Tricycle Operators and Drivers Association) is an organization of tricycle operators and drivers that are recognized and regulated by local government units DILG (2020). In this study, it refers to ACV (Amparo, Capitol, Victory) TODA in Amparo Subdivision, Barangay 179, Caloocan City.

CHAPTER 2

Review of Related Literature and Studies

This chapter presents a review of foreign and local literature and studies that are related to the present research. These readings will serve to strengthen the theoretical frame of references which the study is based on.

Foreign Literature

Reliable transportation is critical to access employment, education, healthcare, social services, and other key destinations. Gaps in service coverage or service hours can negatively impact users' ability to make these necessary trips. First-last mile transportation services aim to connect communities to transportation networks by providing a link between fixed-route transit and travelers' origins and destinations. Without adequate first-last mile services, many of these trips may not take place at all, hindering people from accessing services and opportunities (Villagran, 2024).

According to Monney (2023) the main mode of transportation in Sub-Saharan Africa is informal public transit (IPT), which adapts quickly to the demands of all users, including the most impoverished ones. Even while this type of public transportation helps cities expand, there are still significant drawbacks that need to be addressed, such as fierce competition for passengers, high levels of air pollution, and subpar safety records. The UKAID-funded TRANSITIONS project examined the relationship between public authorities and IPT operators in the five cities of

Accra, Kumasi, Freetown, Cape Town, and Maputo in order to better understand how IPT may be supported to offer enhanced service quality.

The development and integration of informal para-transit services with official public transport systems have not gotten much attention, despite their vital role in mobility systems. At the tactical planning level, we offer a revolutionary framework for integrating para-transit and public transportation. We formulate this integration as a Transit Network Frequency Setting Problem (TNFSP), which is a two-step problem. A network-wide multi-modal transit assignment based on headway is the first phase in the TNFSP process (Gadepalli, 2024).

According to Rahman (2023) a community's transportation infrastructure is an essential component of its everyday operations. For society to function, transportation is essential. Since using the transportation system requires moving both persons and objects, there needs to be an access point. Indeed, a key element of this transportation objective is the bus service. However, no bus station in our nation has adequate amenities and administration.

Since the effects of transportation technology on various communities are so diverse, it is necessary to have better techniques to assess the implementation of new technologies with little data. Technology like micro-transit is one example. We provide a new framework based on current techniques to "upscale" the scarce data available in order to perform forecast modeling and further decision-support analysis when none could previously be done. The framework includes creating a synthetic scenario generating process, updating a within-day micro-transit simulator with a

parametric design, and extending an initial day-to-day adjustment process to accommodate both first/last mile access trips and direct journeys (Rath, 2023).

Local Literature

According to Orbos, (2020) among every barangay in the Philippines, tricycles are the primary means of transportation, not jeepneys. Tricycles are the Filipinos' true "final mile" transport beast of burden—cheap, efficient, and essential. It is the go-to vehicle during any occasion. Filipinos utilize it to get to work, the market, school, and even for weddings and funerals in the barangays.

The transportation system in the Philippines has always been a huge problem in the country. For years Filipinos have been facing heavy traffic, which unfortunately, has been part of their lifestyle. The reason behind this is the poor urban planning in the country. The problem with the country's urban planning is that it was solely based on other countries' plans which were designed exactly to cater automobiles, one of which the Philippines is not made for (Guerrero et al. 2020).

The majority of the population of the urban areas in the Philippines is still very dependent on public transportation, especially tricycles. While the urban population is still growing and many new cities are emerging throughout the country, the public transportation system is dominated by informal and small-capacity modes and is yet to catch up with the growing mobility needs of the population (Mars, 2023).

According to Cueto, Uy and Diaz (2021) actual roadside and onboard surveys were done on passengers and drivers traveling from the designated terminal to their destination. There are also a number of risks associated with the existing motorized tricycle that must be addressed for the safety of the passengers and drivers. It was proposed that an electric tricycle be used as an alternate means of public transportation in the city, as a highly sustainable choice that allows the local population to improve their quality of life through mobility and economic activity.

In the Philippines, tricycles are the most prevalent mode of transportation that feeds and supplements other modes of transportation. In Panay Island, there are different provinces that have different physical and economic status which can affect the number of tricycles. This study aims to analyze and assess the current tricycle service operation and practices and municipalities in Panay Island. It also aims to determine the relationship between the socio-economic and physical characteristics of the LGU to the number of tricycles operating in each municipality while also being able to characterize the supply and service operating characteristics of the existing tricycle service in each of the municipalities in the Island of Panay (Suzara, Florogo, & Wong, 2022).

Foreign Study

According to Gadepalli (2024), urban travel demand in developing countries typically has a high dependence on public transport systems. City Governments have been attempting to meet this demand by providing formal bus or rail-based public

transport services, which provide services along fixed routes and pre-determined schedules. In most cases, the available capacity of these formal public transport systems is inadequate to meet the increasing travel demands and service quality expectations of users.

Due to these reasons, informal public transport systems emerged to serve the demand not catered by the formal transit services. These services are called by several names globally, such as informal public transport, para transit (operating alongside the main-haul transit) or Intermediate Public Transport (IPT) services. These services sit between flexible-route-flexible-schedule private transport and fixed-route-fixed-schedule public transport services (Gadepalli et al., 2024).

A community's transportation infrastructure is an essential component of its everyday operations. For society to function, transportation is essential. Since using the transportation system requires moving both persons and objects, there needs to be an access point. Indeed, a key element of this transportation objective is the bus service (Chalermpong, 2025).

Contrary to what some people may think, user experience in Public Transportation starts before passengers actually start the ride on the vehicles and ends after the transportation itself. In order to guarantee a successful transportation service, it is crucial to focus on the whole experience of passengers, from the moment they arrive in terminals to the moment they reach their final destination (Zeigerman, 2023).

According to Mittal (2024), human mobility essentially underlies modern societies. Public transport services, in particular, enable social and economic participation by providing accessible mobility for the majority of the population. At the same time, they support sustainable urban mobility by providing low-emission transport for a large number of travelers while requiring less space and resources than private motor vehicles. Efficiently designing and operating public transport systems thus constitutes a cornerstone for solving current challenges for sustainable and livable cities worldwide.

Local Study

The use of tricycles as a mode of transportation actually poses hazards and adverse effects on the environment's air quality. Further, about 34% of the total vehicular population in the Philippines is made up of two- and three-wheelers which also become the major contributor to pollution and other environmental and health hazards. The use of motorized tricycles is also identified as the source of noise and air pollution exposing the public to a greater danger of health-related problems. For instance, a 2-stroke engine tricycle is known to contribute to air pollution in Jakarta Indonesia. Tricycles are identified as one of the public transport systems causing excessive gas emission contributing to lead and nitrogen dioxide release in the atmosphere (Cueto, Diaz & Uy, 2021).

According to Barabino (2022) one of the countries that widely utilize public transportation is the Philippines. In the Philippines, public transportation is an

important economic sector that connects people and economic hubs across the islands. The Philippines' public transportation system includes road, marine, air, and train transportation. Road transport is an essential sub sector with 98% passenger travel and 58% freight traffic.

The national strategy recognized the importance of an efficient and reliable transport system for delivering sustainable development. The main goals of the EST strategy are (1) to reduce transport sector energy consumption, greenhouse gas (GHG), and air pollution and (2) to promote environmentally sustainable transport systems with low carbon intensity. Local cities are at the front line of EST. Strategies, indicators, and action plans involving national government and local cities are formulated to address key challenges on public health, vehicle emissions, transport planning and travel demand management, non-motorized transport, road safety, land use planning, awareness, and public participation. While policies are in place, there are still longstanding challenges of planning capacities, funding, and lack of leadership interest in EST. The Department of Transportation (DOTr) launched the Public Transport Modernization Program in 2017. (Garcia, 2022).

According to Benenson (2021) despite the extensive transit network in Metro Manila, inter-modal connections between public transportation services are still fragmented. In response, authorities proposed various multi-modal transport terminals around the periphery of the metropolis. However, there is a need to understand how these proposed terminals will impact existing transportation infrastructure and services as well as the current travel demand.

Environmental legislation must be considered, especially in various industries such as transit, particularly here in the tricycle capital of the Philippines, Cabanatuan City. This study intends to assess TODA members with regard to environmental laws and city environmental ordinances and also to determine if there is a significant relationship between the profile of the tricycle drivers and the problems they encounter. This study utilized both quantitative and descriptive analysis to assess the respondents in terms of their operations (De Jesus & Villanueva, 2022).

Synthesis of the Review of Related Literature and Study

The reviewed literature and study emphasize the importance of efficient and sustainable transportation terminal design in improving urban mobility and commuter convenience. Local and foreign sources highlight issues such as congestion, poor sanitation, and disorganized operations. The conditions are similar to those found at the current tricycle terminal at Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City.

The findings also highlight the importance of collaboration between the LGU and the transport organization in ensuring effective terminal management. The inclusion of eco-friendly features such as solar panels, water harvesting systems, and waste segregation is in line with sustainable development practices. Overall, these provide support for the proposed design of the Integrated Tricycle Terminal for ACV TODA, which aims to create a more organized, functional, sustainable, convenient, and commuter-friendly facility.

CHAPTER 3

Research Methodology

This chapter presents the methods and procedures of research applied to gather the needed data. It contains the research design, population, respondents, sampling techniques, instruments and the statistical treatment of data.

Research Design

This study will employ design-based research (DBR) using a mixed-methods approach. As cited by Scott et al. (2020), DBR aligns with the practices used in engineering and applied sciences, where results are designed to address specific goals or problems (Brown, 1992; Joseph, 2004; Middleton et al., 2008; Kelly, 2014). Typically, this process consists of three phases: (1) Needs assessment and site analysis, (2) Design and development, and (3) Evaluation and validation. Additionally, a mixed-methods approach will be employed in each phase, incorporating both quantitative and qualitative data collection techniques to guarantee that the design is user-centered, evidence-based, functional, and contextually suitable. Furthermore, quantitative data will ensure objectivity and precision, while qualitative data will promote context and human-centred design.

The primary goal is to determine the existing conditions, problems encountered, and the necessary amenities for the proposed integrated tricycle terminal of ACV TODA in Amparo Subdivision, Barangay 179, Caloocan City.

Sample and Population

This study will employ quota sampling, a non-probability sampling technique, where participants are chosen based on specific traits to ensure representation of key subgroups. It helps researchers gather data from different segments of the population efficiently without relying on random selection. Specifically, this paper will employ a non-proportional quota sampling technique, by setting a minimum quota for each subgroup regardless of the exact population proportion, as the researchers want to explore specific subgroups more deeply, even if they are smaller in the general population (Hassan, 2024). The subgroups include (a) commuters, (b) tricycle drivers, and (c) residents. For each subgroup, the quota will be 40 respondents instead of 30 to improve precision and have better group comparisons.

Additionally, the key informant interviews (KII) will only involve 10-50 participants (Creswell & Creswell, 2018). For the semi-structured interview, the participants should possess the following criteria during phase 1 for the needs assessment: (1) Registered TODA Tricycle drivers, (2) incumbent barangay 179 officials, and (3) passengers aged 18 and above, while participants for the interview during phase 3 for evaluation purposes are the following: architects, civil engineers, and city planning officers. The participants will be licensed professionals with at least three (3) to five (5) years of work experience in their respective fields to make sure their comments and evaluations about the proposed terminal design are reliable and based on real experience.

Research Instruments

This study will employ the following tools and methods:

Questionnaire

The primary instrument to be used in quantitative data collection is a survey questionnaire. The researchers will use a standardized survey questionnaire that will undergo a series of validation processes, including face, content, and construct validity. The questions will be designed in both English and Tagalog to ensure better understanding among the respondents. The survey questionnaire will include a five-point Likert Scale, which quantifies the level of agreement or assessment of respondents, as well as multiple-choice questions.

Interview Guide

For the qualitative data, an interview guide will be used to conduct a key-informant interview (KII). Using open-ended questions allows the researchers to fully understand the depth of the phenomenon. Smartphones or audio recorders will also be used to capture responses for transcription and data analysis purposes. Field notes or observation checklists will also be used during the interviews.

Site Analysis Instruments

To gather physical data for the design proposal, the following site analysis instruments will be used:

a. Site survey form/observation - for recording data on area dimensions/boundaries, and the existing conditions around the vicinity.

b. Measuring tools - distance measuring tape and tape measure will used to obtain accurate measurement of the site

c. Traffic count sheet - used to quantify the number of tricycles and passengers at specific time intervals (peak and non-peak hours).

Validation of the research instruments

Three professionals, either having conducted their own research or serving on a panel, will validate the research instruments. The professionals will verify that the items in the questionnaire and the interview questions in the interview guide or script are valid and reliable.

Design

The researchers will use AutoCad and SketchUp software to develop the architectural plans of the proposed terminal. These plans will include; vicinity map and site development plan, elevation of terminal, ground floor plan and a three-dimensional (3D) architectural layout.

Cost Estimation

The researchers will use WPS Spreadsheets as a tool for organizing and computing the estimated expenses of the project. The spreadsheets served as the detailed cost that included all required materials, labor and equipment necessary to the construction.

Data Gathering

The study follows a design-based research (DBR) process structured into three phases: (1) Needs assessment and site analysis, (2) Design and development, and (3) Evaluation and validation.

For Phase 1, the researcher will begin the needs assessment by submitting a formal letter of request to the Barangay 179 Office and the ACV TODA officials to seek permission to conduct the study. Upon approval of three professionals, the validated survey questionnaires will be distributed to the respondents using quota sampling at the tricycle terminal and nearby areas. The researchers will guide the respondents in answering the questionnaires to ensure the accuracy and reliability of their responses. The data gathering will be conducted through face-to-face interaction. Selected tricycle drivers, commuters, and Barangay 179 officials will also be interviewed for an in-depth understanding of the situation.

All responses will be carefully checked, tallied, and encoded after the data collection for statistical and thematic analysis to ensure that the data collected

accurately reflect the current conditions and perceptions related to the existing tricycle terminal.

Furthermore, site analysis will also be carried out to obtain actual measurements and physical conditions of the proposed site. After gathering all the important data, the researcher will use AutoCad software in creating two-dimensional (2D) drawings to draft the architectural plans including the vicinity map and site development plan, elevation of terminal and ground floor plan, the researcher will use also SketchUp software in creating three-dimensional (3D) model layout.

Lastly, in Phase 3, the proposed terminal design will be presented to selected experts such as architects, civil engineers, and city planning officers for validation. These experts will assess the design based on National Building Code of the Philippines (NBCP), specifically, National Structural Code of the Philippines (NSCP) 2015 version which is a comprehensive set of regulations governing the design, construction, and maintenance of structures in the Philippines. This code provides the technical requirements to ensure buildings are safe, resilient, and suitable for their intended use. Their feedback will be used and finalize the proposed terminal model to ensure that it meets the overall framework and minimum standards for building location, site, design, quality of materials construction, use, occupancy and maintenance to safeguard life, health, property and public welfare.

Data Analysis

a. Statistical Tool

To analyze the quantitative data gathered from the survey, the researchers will use the following statistical tools:

Frequency and Percentage

To describe the demographic profile of the respondents.

$$\boldsymbol{P = \frac{f}{N}\ x\ 100}$$

Where:

P = Percentage

f = Frequency

N = Total number of respondents

Weighted Mean

To determine the level of assessment on the existing condition and problems of the tricycle terminal.

$$\mathbf{W = \frac{\sum fX}{N}}$$

Where:

W = Weighted Mean

f = Frequency

X = Assigned weight of each response

N = Total number of respondents

Likert Scale

To identify which problems were most significant based on respondents' answers. The results were interpreted using the following scale and verbal interpretation.

Scale	Range	Verbal Interpretation
5	4.21 - 5.00	Strongly Agree
4	3.41 - 4.20	Agree
3	2.61 - 3.40	Neutral
2	1.81 - 2.60	Disagree
1	1.00 - 1.80	Strongly Disagree

b. Thematic Analysis

Thematic analysis will be used to analyze the collected interview data. It is a qualitative analysis method that is a widely recognized approach that allows researchers to identify, analyze, and present patterns in data. According to Braun and Clarke (2012), thematic analysis provides a flexible and popular method for qualitative data analysis. The procedure for thematic analysis involves several steps. First, familiarization involves reviewing all the gathered information or data to become familiar with it. The researchers started noticing some patterns in the data. Next is coding, where the researchers transformed the whole text into a smaller text to make it easier to analyze or describe the nature of the content. The third step is generating themes; the researchers will combine the related codes to form a theme. While reviewing the themes, the researchers will examine them to ensure that they

accurately represent what the participants share. The fifth step is defining and naming themes. In this step, the researchers will define and name each theme to reflect its content. The last step is writing, where the researchers will write up the analysis.

Questionnaire

We, the **4th year** students of **La Concepcion College** taking the course of **Bachelor of Science in Civil Engineering,** are currently conducting our research entitled **"Design of an Integrated Tricycle Terminal of Amparo, Capitol, Victory TODA in Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City."**

This survey aims to collect information about the current situation, challenges, and desired features for the proposed integrated tricycle terminal of ACV TODA in Amparo Subdivision, Barangay 179, Caloocan City.

The information to be gathered will be used for academic purposes and will be treated with strict confidentiality.

Name (Optional) : _____

A. Respondent's Profile
Please check (✔) your answer. (Pakilagyan ng tsek (✔) ang iyong sagot.)

Age (Edad) :

☐ 18–25 ☐ 26–35 ☐ 36–45 ☐ 46 and above

Gender (Kasarian) :

☐ Male (Lalaki) ☐ Female (Babae)

Role (Katayuan) :

☐ Tricycle Driver ☐ Commuter ☐ Resident ☐ Other/s:_____

B. Survey Questionnaire
Please check (✔) your answer. (Pakilagyan ng tsek (✔) ang iyong sagot.)

Legend

Scale		
5	Strongly Agree	Lubos na Sumasang-ayon
4	Agree	Sumasang-ayon
3	Neutral	Walang Panig
2	Disagree	Hindi Sumasang-ayon
1	Strongly Disagree	Lubos na Hindi Sumasang-ayon

I. Existing Conditions of the Current Tricycle Station

	5	4	3	2	1
The current tricycle station provides enough space for loading and unloading of passengers. (Ang kasalukuyang terminal ay may sapat na espasyo para sa pagsakay at pagbaba ng mga pasahero.)	☐	☐	☐	☐	☐
The terminal has proper waiting areas for commuters. (May maayos na hintayan para sa mga pasahero.)	☐	☐	☐	☐	☐
The terminal location is safe and convenient for both drivers and passengers. (Ang lokasyon ng terminal ay ligtas at maginhawa para sa mga drayber at pasahero.)	☐	☐	☐	☐	☐
The tricycle station is well-organized and clean. (Ang terminal ay maayos at malinis.)	☐	☐	☐	☐	☐

II. Problems Encountered in the Current Terminal

	5	4	3	2	1
The terminal lacks space for parking and maneuvering. (Kulang sa espasyo para sa paradahan at pagmaniobra.)	☐	☐	☐	☐	☐
There are no proper waiting sheds or comfort rooms for commuters. (Walang maayos na hintayan o palikuran para sa mga pasahero.)	☐	☐	☐	☐	☐
The terminal causes traffic congestion in the surrounding area. (Nagiging sanhi ng pagsisikip ng trapiko ang terminal.)	☐	☐	☐	☐	☐
The current facilities are not sufficient to meet daily operations. (Hindi sapat ang mga pasilidad para sa pang-araw-araw na operasyon.)	☐	☐	☐	☐	☐

III. Proposed Amenities and Design Features for the New Terminal

	5	4	3	2	1
The proposed terminal should include driver's lounge and resting area. (Dapat may lugar para sa pamamahinga ng mga drayber.)	☐	☐	☐	☐	☐
The terminal should have proper passenger waiting sheds and comfort rooms. (Dapat may maayos na hintayan at palikuran para sa mga pasahero.)	☐	☐	☐	☐	☐
The terminal should have sufficient lighting, signage, and waste disposal facilities. (Dapat may sapat na ilaw, karatula, at basurahan ang terminal.)	☐	☐	☐	☐	☐
The community will benefit from an improved and organized terminal design. (Makikinabang ang komunidad sa maayos at organisadong disenyo ng terminal.)	☐	☐	☐	☐	☐

Thank You! Maraming Salamat!

Interview Guide

For Commuters and Residents

1. **How would you describe your daily experience using the tricycle terminal in Makabud Street?** (Paano mo ilalarawan ang iyong pang-araw-araw na karanasan sa paggamit ng terminal ng tricycle sa Makabud Street?)

2. **What challenges do you encounter when accessing the terminal (e.g., space, crowding, safety, or convenience)?** (Anong mga hamon ang nararanasan mo kapag pumapasok sa terminal (hal., espasyo, siksikan, kaligtasan, o kaginhawahan)?

3. **How do you think the current terminal setup affects pedestrian flow and nearby establishments?** (Paano sa tingin mo naaapektuhan ng kasalukuyang terminal setup ang daloy ng pedestrian at mga kalapit na establisyimento?)

4. **What improvements or amenities would you like to see in a new terminal design?** (Anong mga pagpapahusay o amenities ang gusto mong makita sa isang bagong disenyo ng terminal?)

5. **How important are factors like safety, comfort, and cleanliness in your commuting experience?** (Gaano kahalaga ang mga salik tulad ng kaligtasan, kaginhawahan, at kalinisan sa iyong karanasan sa pag-commute?)

For Tricycle Drivers and TODA Members

1. **What operational challenges do you face in the current terminal (e.g., passenger congestion, parking, queuing, or maintenance)?** (Anong mga hamon sa pagpapatakbo ang kinakaharap mo sa kasalukuyang terminal (hal., pagsisikip ng pasahero, paradahan, pagpila, o pagpapanatili)?

2. **How does the current terminal layout affect your work efficiency or income?** (Paano nakakaapekto ang kasalukuyang layout ng terminal sa iyong kahusayan sa trabaho o kita?)

3. **In what ways do you think a new terminal design could improve daily operations and traffic flow?** (Sa anong mga paraan sa tingin mo ang isang bagong disenyo ng terminal ay maaaring mapabuti ang pang-araw-araw na operasyon at daloy ng trapiko?)

4. **What facilities (e.g., waiting areas, sanitation, organization system) do you believe are most needed for both drivers and passengers?** (Anong mga pasilidad (hal., waiting area, sanitation, organization system) ang pinaniniwalaan mong pinakakailangan para sa parehong mga driver at pasahero?)

5. **How do you coordinate with other drivers and commuters during peak hours, and how might better organization help?** (Paano ka nakikipag-coordinate sa iba pang mga driver at commuter sa mga peak hours, at paano makakatulong ang mas mahusay na organisasyon?)

For Barangay Officials and Local Authorities

1. **What are the main issues or complaints you've received about the current tricycle terminal?** (Ano ang mga pangunahing isyu o reklamo na iyong natanggap tungkol sa kasalukuyang terminal ng tricycle?)

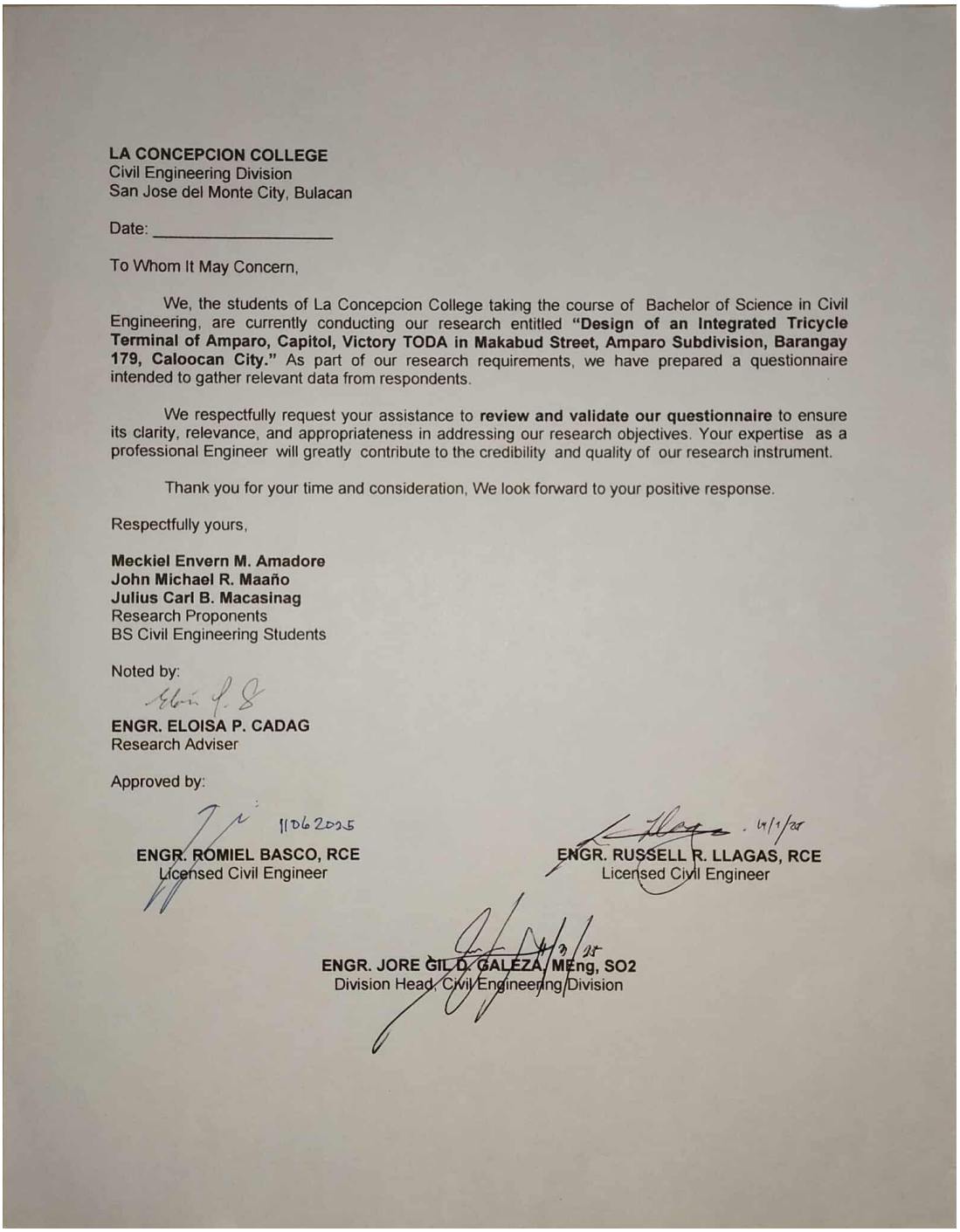
2. **How does the existing terminal affect local traffic and pedestrian safety?** (Paano naaapektuhan ng kasalukuyang terminal ang lokal na trapiko at kaligtasan ng pedestrian?)

3. **What policies or plans has the barangay implemented or considered to improve transportation systems in the area?** (Anong mga patakaran o plano ang ipinatupad o isinaalang-alang ng barangay upang mapabuti ang sistema ng transportasyon sa lugar?)

4. **What design or structural considerations do you think should be prioritized for the new terminal (e.g., space allocation, waste management, accessibility)?** (Anong mga pagsasaalang-alang sa disenyo o istruktura ang sa tingin mo ay dapat unahin para sa bagong terminal (hal., paglalaan ng espasyo, pamamahala ng basura, accessibility)?)

5. **How can the proposed terminal support sustainability and community order within Barangay 179?** (Paano masusuportahan ng iminungkahing terminal ang pagpapanatili at kaayusan ng komunidad sa loob ng Barangay 179?)

Signed Letter of Validation of Questionnaire



LA CONCEPCION COLLEGE
Civil Engineering Division
San Jose del Monte City, Bulacan

Date: _____

To Whom It May Concern,

We, the students of La Concepcion College taking the course of Bachelor of Science in Civil Engineering, are currently conducting our research entitled **"Design of an Integrated Tricycle Terminal of Amparo, Capitol, Victory TODA in Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City."** As part of our research requirements, we have prepared a questionnaire intended to gather relevant data from respondents.

We respectfully request your assistance to **review and validate our questionnaire** to ensure its clarity, relevance, and appropriateness in addressing our research objectives. Your expertise as a professional Engineer will greatly contribute to the credibility and quality of our research instrument.

Thank you for your time and consideration, We look forward to your positive response.

Respectfully yours,

Meckiel Envern M. Amadore
John Michael R. Maaño
Julius Carl B. Macasinag
Research Proponents
BS Civil Engineering Students

Noted by:

ENGR. ELOISA P. CADAG
Research Adviser

Approved by:

11062025

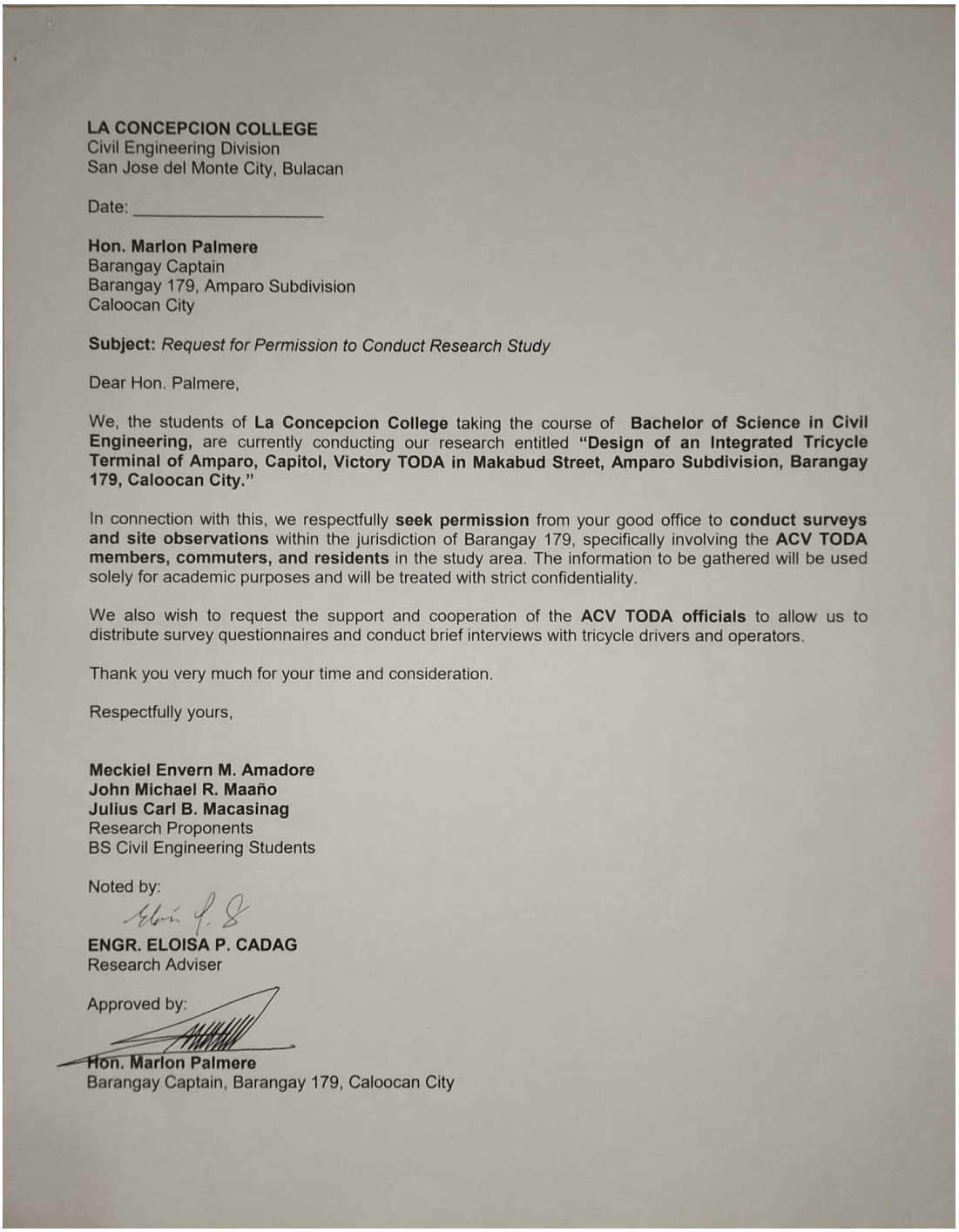
ENGR. ROMIEL BASCO, RCE
Licensed Civil Engineer

6/9/25

ENGR. RUSSELL R. LLAGAS, RCE
Licensed Civil Engineer

ENGR. JORE GIL D. GALEZA, MEng, SO2
Division Head, Civil Engineering Division

Signed Request Letter to Conduct Research



LA CONCEPCION COLLEGE
Civil Engineering Division
San Jose del Monte City, Bulacan

Date: _____

Hon. Marlon Palmere
Barangay Captain
Barangay 179, Amparo Subdivision
Caloocan City

Subject: *Request for Permission to Conduct Research Study*

Dear Hon. Palmere,

We, the students of **La Concepcion College** taking the course of **Bachelor of Science in Civil Engineering,** are currently conducting our research entitled **"Design of an Integrated Tricycle Terminal of Amparo, Capitol, Victory TODA in Makabud Street, Amparo Subdivision, Barangay 179, Caloocan City."**

In connection with this, we respectfully **seek permission** from your good office to **conduct surveys and site observations** within the jurisdiction of Barangay 179, specifically involving the **ACV TODA members, commuters, and residents** in the study area. The information to be gathered will be used solely for academic purposes and will be treated with strict confidentiality.

We also wish to request the support and cooperation of the **ACV TODA officials** to allow us to distribute survey questionnaires and conduct brief interviews with tricycle drivers and operators.

Thank you very much for your time and consideration.

Respectfully yours,

Meckiel Envern M. Amadore
John Michael R. Maaño
Julius Carl B. Macasinag
Research Proponents
BS Civil Engineering Students

Noted by:

ENGR. ELOISA P. CADAG
Research Adviser

Approved by:

Hon. Marlon Palmere
Barangay Captain, Barangay 179, Caloocan City